Next Generation (NexGen) Messaging System

Investment Analysis Report

June 12, 2001

Mission Need Statement #334

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Approved By: _____ Date: _____
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Executive Summary

This report documents the activities that led to the development of the Investment Analysis Report (IAR) and the Acquisition Program Baseline (APB) for the Next Generation (NexGen) Messaging System. It presents a description of the architectural design selection process and the associated cost analysis for the Federal Aviation Administration (FAA) migration to a new, enterprise-wide messaging system configuration.

Today, the electronic mail (E-mail) system servicing the Federal Aviation Administration (FAA) is based on one primary product vendor, Lotus cc:Mail. The current E-mail system consists of over 850 post offices deployed at 378 different geographic locations to serve approximately 43,000 E-mail users in the FAA regions. A centralized help desk staff, along with approximately 735 primary and backup E-mail administrators, is involved in the day-to-day operations and support of the current E-mail configuration.

The current FAA cc:Mail configuration has a supportability crisis in that Lotus announced it will discontinue support for cc:Mail. Lotus has not sold the cc:Mail product since October 31, 2000, thus preventing the FAA from obtaining additional client licenses for cc:Mail. This has precluded, at a minimum, the addition of the air traffic control (ATC) personnel. Furthermore, Lotus will discontinue all customer support for the cc:Mail product line after October 31, 2001. Although Lotus will allow the FAA to continue using cc:Mail at no additional cost after October 31, 2001, Lotus has advised the FAA that it will not release the source code. Therefore, the FAA cannot maintain or make necessary changes to the existing product. It is anticipated that, after losing vendor support, the cc:Mail will degrade to unserviceable levels in less than six months presenting the FAA with an immediate need to plan a replacement.

Since 1993, the primary FAA E-mail requirement has been to maintain a single FAA-wide E-mail system. Nevertheless, the FAA-wide E-mail system is currently functioning on a mix of hardware platforms and operating systems. The need to replace cc:Mail presents an opportunity to implement new technology and applications to improve messaging and communication capability, while reducing the cost of ownership through standardization.

The Next Generation (NexGen) Messaging System Investment Analysis (IA) Team considered multiple replacement scenarios including a consolidated model and outsourcing. The recommended alternative presented to the Joint Resources Council (JRC), in August 2000, was consolidation to no more than 268 servers in Phase 1, and conduct additional analysis of the FAA infrastructure to determine if further consolidation could take place. After much analysis, the FAA decided that further consolidation could take place, but that performance could not be determined without exhaustive studies of the existing communications links. Further, since there are three commercially available software solutions, the FAA would need to study each possible solution relative to the current infrastructure.

The current FAA strategy is to allow the offeror to propose an acceptable NexGen consolidation design based on the proposed software, hardware, and the current FAA infrastructure. The FAA will not provide a solution for the consolidation of post offices, thereby placing all of the risk for messaging system performance on the offeror. The FAA believes that allowing industry to

evaluate what is in place and comparing it with their proposed solution will result in a more cost-effective approach to any required telecommunications upgrades.

The FAA conducted an independent assessment to determine the most technically realistic design for the NexGen system. This was done based on cost and technical information received from industry experts and gleaned from past experience. It is recommended that the FAA implement a network architecture design based on a consolidation level of between 12 and 73 sites with an average of 53 sites.

Consolidation to an average of 53 sites would allow the FAA to significantly reduce expenditure on system administration support. The administration cost of the current cc:Mail system is estimated at $25M per year. This estimate is based on 100 full-time out of 450 total positions supporting 855 cc:Mail post offices at 378 geographic locations. By comparison, the NexGen system administration would require 152 full-time positions costing the Agency an estimated $13M per year. NexGen will provide $12M in productivity savings per year. This reduction in system administration support required to maintain the E-mail system would allow personnel to increase their level of effort on other programs. The recommended option delivers value in then it facilitates a more efficient utilization of system administrators, resulting in a lower life cycle cost.

At the August JRC the IPT defined three phases for modernizing the messaging system for the Agency. Phase 1 replaces the current e-mail system. Phase 2 replaces and upgrades systems with new functionality such as mobile communications and calendars. Phase 3 introduces new technologies such as videoconferencing.

This Investment Analysis Report, APB, and corresponding funding request apply to Phase 1 only. Phases 2 and 3 will require additional analysis and JRC approvals. Additional follow-on actions were identified at the JRC. These included: conducting a study to determine the impact on telecommunications bandwidth utilization; establishing an Acquisition Program Baseline (APB) before contract award and vendor selection; and, returning to the JRC for NexGen Phases 2 and 3 in February 2002.

The Budget Integration Team (BIT) conducted a review of the cost baseline in the APB in May 2001. The APB includes a schedule, performance, and cost baseline for replacing the current e-mail system. This phase will be fully implemented by January 2003. The cost baseline was developed prior to final vendor or network architecture design determination. The cost baseline includes both non-recurring and recurring costs. Non-recurring costs primarily comprise activities associated with implementation of the system, including hardware installation and tech refresh. Recurring costs primarily reflect activities associated with maintaining the system, including system administration support and help desk staff. The basis of estimate (BOE) was verified with the vendors' cost information and the range of technical and cost information provided by the vendors was used in the cost risk analysis. Table ES-1 shows a summary of the cost required for the Program Office (ASU-500) to implement and maintain the new e-mail system.

Table ES-1. NexGen Life Cycle Cost Summary

Option Two Cost Baseline (TY$M) 53 Servers (3,2)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
Non-Recurring Total	$ 11.6	$ 13.8	$ 4.1	$ 3.2	$ 4.4	$ -	$ 3.4	$ 4.7	$ -	$ -	$ 45.3
Recurring Total	$ 8.6	$ 20.3	$ 20.8	$ 20.5	$ 20.9	$ 19.0	$ 19.0	$ 19.3	$ 20.1	$ 20.5	$ 189.0
Grand Total	$ 20.2	$ 34.1	$ 24.9	$ 23.7	$ 25.3	$ 19.0	$ 22.4	$ 24.0	$ 20.1	$ 20.5	$ 234.5

Executive Summary

Based on the analysis conducted, the Investment Analysis Team recommends JRC approval for the following:

- The replacement of the current e-mail system with the Next Generation Messaging System by ASU-500
- The APB funding profile of $234M in Operations and Maintenance funds over a 10-year life cycle.

TABLE OF CONTENTS

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

This report documents the activities that led to the development of the Investment Analysis Report (IAR) and the Acquisition Program Baseline (APB) for the Next Generation (NexGen) Messaging System. It presents a description of the architectural design selection process and the associated cost analysis for the Federal Aviation Administration (FAA) migration to a new, enterprise-wide messaging system configuration.

As specified in the Acquisition Management System (AMS) and the Investment Analysis Process Guideline, this report summarizes the assumptions, mission need, requirements, alternatives, and economic analysis. Finally, it summarizes the investment recommendations to the Joint Resources Council (JRC).

1.1 Background

The JRC approved the Mission Need Statement (MNS-334) for the NexGen Messaging System on May 17, 2000. Following guidance provided by the JRC, the NexGen Investment Analysis (IA) Team conducted an Alternatives Analysis of the critical issues set forth in the MNS-334 to develop a replacement product selection methodology suitable to address the key issues in the MNS-334. This analysis was presented to the JRC on August 30, 2000, resulting in guidance to proceed with further analysis and a need to return to the JRC prior to contract award.

Since 1993, the FAA electronic mail (E-mail) system has been based on a single product vendor, Lotus cc:Mail. The current E-mail system consists of over 850 post offices deployed at 378 different geographic locations to serve approximately 43,000 E-mail users in the FAA regions. A centralized help desk staff, along with approximately 735 primary and backup E-mail administrators, is involved in the day-to-day operations and support of the current E-mail configuration. In many cases, the E-mail system was deployed on existing hardware, which was already supporting other applications, and ran on different operating systems. A significant amount of hardware will need to be replaced or upgraded to support a new messaging system.

Since FAA-wide implementation of cc:Mail was completed, the number of users has grown 20% per year and message volumes have more than doubled annually. Messaging has become a key tool for FAA communications. Since new messaging and collaboration technologies are becoming increasingly attractive to the lines of business (LOBs), there is a risk that the LOBs will again independently implement E-mail, creating a messaging system that does not operate seamlessly across the FAA.

Lotus stopped sales of all cc:Mail products on October 31, 2000. This has prevented the FAA from obtaining additional client licenses to add additional users. All vendor support for cc:Mail will be discontinued October 31, 2001. Lotus has announced it will not release the source code; therefore, the FAA will not be able to maintain the product itself or make code changes. The FAA help desk logs an average of 750 trouble calls yearly that usually require a Lotus technical representative to repair, such as a failed post office. A significant number of calls require use of proprietary software tools to resolve. When access to these proprietary tools becomes unavailable, sections of the cc:Mail will start to shut down, eventually resulting in the total loss

of in-transit and stored E-mail archives. At the current failure rate, it is projected that a failure that would render cc:Mail unserviceable could occur within six months after the vendor ends support in October 2001. Based on the discontinuation of all support for the product used by the FAA before the end of 2001, the FAA has a desperate need to find a replacement solution.

The migration to a new messaging system provides an opportunity for the FAA to consolidate post offices, standardize configurations, reduce the number of servers used for E-mail, accommodate unmet demand, and devote servers to be used only by the messaging system to increase performance. Because of this and other risks, cc:Mail needs to be replaced in a timely manner.

1.2 Scope

Attachment 1, NexGen Final Requirements Document, describes three phases of implementation. This IAR covers Phase 1 only. Additional analyses will be conducted for Phases 2 and 3 before any decision is made to implement those phases.

1.3 NexGen Messaging System Analysis Approach

The NexGen IA Team conducted a market survey and talked to several vendors, including both traditional E-mail package providers and outsourcers. The IA Team also spoke with several government agencies that recently upgraded their E-mail systems.

1.4 Assumptions, Constraints, and Conditions

The FAA will implement Phase 1, as described in the Requirements Document. This Phase will replace the existing E-mail functionality, consolidate post offices, and begin to build the infrastructure to support the future phases. The following is a list of assumptions, constraints, and conditions used in this analysis:

- Support staff provided by the LOBs/regions to administer and maintain the messaging domain directory architecture.
- Although the goal is to have all messaging servers specifically dedicated to mail storage and mail routing, the JRC directed the Program Management Office and LOBs to identify and use existing field equipment whenever possible to reduce costs. To the extent possible, remote access servers will be dedicated to providing remote connectivity for external users or external servers to provide a secure point of entry. Gateway servers needed to connect external-messaging systems also will be dedicated.
- Messaging services will be 24 hours a day, 7 days a week, with 99.5% reliability and a goal of 99.8% reliability. Messages will be routed as soon as possible, rather than scheduled. A message will take no longer than 15 minutes to traverse the FAA Intranet from any point to any other point.

- The remote access solution proposed must scale across the population of replacement servers supporting a mixed geographical distribution of 60,000 users. Multiple copies of the same data and directories must be synchronized worldwide, giving the illusion to distributed users that they are all sharing the same set of the data.
- The messaging vendor will provide technological product refresh on a schedule that corresponds to industry availability. Version updates will occur within 60 days of commercial release or be delayed only by FAA direction. Any requirement that is not specifically addressed in the generic baseline solution, typically supplied by vendors, will be fulfilled and implemented via the use of a third party solution add-on or extra cost vendor option.

2.0 MISSION NEED, REQUIREMENTS, AND STRATEGIC OPPORTUNITIES

2.1 Mission Need

MNS-334 states that the FAA needs to replace the current FAA-wide E-mail system with an enterprise-wide NexGen messaging system that is reliable, secure, high-performance, and interoperates well with frequently used applications and data resources. The replacement messaging system must preserve a uniform messaging environment that provides all the capabilities of the current E-mail system.

2.2 NexGen Messaging System Replacement Requirements

The requirements contained in the *Next Generation Messaging Decision-Ready Package*, dated January 30, 1998, provided an initial assessment of the current FAA-wide E-mail system. This document also identified cc:Mail replacement issues and highlighted several evolving functional and business requirements that pertain to the FAA's future messaging environment.

During 1999, under direction of the FAA Chief Information Officer (CIO), the IA Team reconvened to update the original set of user-messaging requirements. These updates are contained in Attachment 1, NexGen Final Requirements Document, which was signed by the CIO on June 30, 2000. The updated user-messaging requirements expand the scope of effort to recognize that many of the messaging system's functionality requirements provide communication and workflow efficiencies only when applied in combination with the broad variety of users that constitute the FAA enterprise-wide.

The following is a list of revised user-messaging requirements:

- Legacy cc:Mail, release 8, features will be retained in the NexGen messaging system.
- The replacement messaging system must be capable of providing messaging services 24 hours a day, 7 days a week, with a 99.5% per calendar month and a goal of 99.8% per calendar month reliability to meet the modernized availability requirements.
- The users need a reliable, secure, high-performance messaging system that interoperates well with frequently used FAA applications and data resources.
- FAA users now require special security requirements that include the ability to sign, encrypt and decrypt messages, and to interoperate with the Defense Messaging System (DMS).
- The replacement messaging system needs to provide a robust directory service with Public/Private Key Infrastructure (PKI) capabilities to simplify and streamline access to network and information resources, via features such as single sign-on access controls.

- The replacement messaging system must provide the infrastructure improvements necessary to meet new user requirements in areas such as E-mail, group calendars and scheduling, and workflow that supports a collaborative workplace among staff members working at geographically distributed locations.

Phase 1 includes features that exist in the current E-mail system, or which have been ranked as critical in conducting the FAA's day-to-day business. The goal for Phase 1 is to deploy a replacement messaging system that is most capable of using the existing network infrastructure and the variety of operating systems used in the FAA environment. Specific messaging system requirements targeted in Phase 1 are:

- On-line access and standalone/off-line access
- Calendaring and scheduling
- Delivery and message notification
- LDAP compliant directories
- Message retention and organization
- Interoperability
- Security and virus prevention
- Interface to the DMS
- System administration and performance monitoring tools

2.3 Strategic Opportunities

Phase 1 will occur in two stages. Stage 1 replaces and decommissions the existing E-mail functionality at the nine regional offices, FAA Headquarters, Mike Monroney Aeronautical Center, and the William J. Hughes Technical Center. Stage 2 will deploy the NexGen to all levels below the regional offices to support the remaining FAA users.

3.0 BUSINESS MANAGEMENT AND ANALYSIS

3.1 Current FAA Business Practices

The FAA's current E-mail system is based on one primary vendor's product, but was implemented on multiple platforms and operating systems over a period of time. It serves approximately 43,000 users at over 850 post offices deployed at 378 different geographic locations, using 735 primary and backup administrators. The cost of the current E-mail system is estimated at $25 million dollars per year for 100 full-time positions out of 450 total positions providing system administration support to 855 post offices at 378 geographical locations.

The NexGen system would enable the FAA to reduce the number of system administrators to between 152 full time positions. This translates into an average savings in productivity of $12M annually. The remaining system administrators would be available to engage in other value-added activities for the FAA.

MNS-334 recognized that messaging has evolved beyond E-mail and is now an integral part of the FAA's ability to communicate internally and with external customers. The use of a unified E-mail system has contributed to organizational cohesiveness and more effective communication across the LOBs of the FAA. The users seek to preserve a uniform messaging environment that provides all the capabilities of the current E-mail system and is easy to use. In addition, emerging security requirements demand new capabilities be incorporated to prevent unauthorized access to the messaging system. These capabilities include the ability to sign, encrypt and decrypt messages, and interoperate with the DMS.

3.2 Industry Impact

When the FAA first bought E-mail products, the primary benefit was in the added functionality the technology offered for electronic communications and sending file attachments. E-mail has now evolved to the foundation of workgroup computing. While E-mail continues to manage electronic communications for the workgroup, new distributed messaging applications provide the opportunity for a more strategic application of technology that carries the possibility of exponential improvement in productivity. A new messaging system could provide the platform needed to implement distributed applications that can access archived sources of information. This then would provide critical information to managers and other users to improve short- and long-term FAA decisions. This also would allow the FAA to fundamentally change the way it performs its business by bringing automation into new areas where work is manually performed. These technological advances in electronic messaging and collaboration products offer capabilities the FAA can implement to increase efficiency, lower operational costs, and meet expectations of external organizations.

4.0 ALTERNATIVES ANALYSIS

The primary objective of the NexGen acquisition program is to procure a commercial-off-the-shelf (COTS) or non-developmental item (NDI) messaging system product to replace the current E-mail system. In this end, as part of the JRC-2A analysis, the IA Team considered multiple acquisition alternatives, some of which had multiple subcategories. The two most feasible candidate alternatives were Consolidation and Outsourcing. The IA Team concluded that the Consolidation Alternative to a maximum of 268 sites provided the FAA with the greatest cost efficiency and technical capacity. This was presented to the JRC at the August 2000 meeting. Further, the IA Team decided to allow the offeror, rather than the FAA, to determine the specific consolidated design.

4.1 Background

A detailed survey of the existing cc:Mail system was conducted in 1999. The survey results reflect that approximately 800 messaging suites would need to be deployed in a like-for-like messaging replacement scenario to support only E-mail. The current cc:Mail system is deployed with other applications installed on the same server. These servers consist of a variety of vendor hardware platforms (e.g., Dell, Sun, Compaq), various operating systems (e.g., Novell, Windows NT, Unix) and versions, and a mixture of network protocols. Only about a third of the current FAA network is reportedly supporting TCP/IP network protocols at the server or client level. There is no reported dominant configuration or combination.

4.2 Assumptions and Constraints

Expanded hardware configuration and enhanced feature deployments will be considered on some type of established priority basis, which will be based on subsequent benefits analysis. The total FAA population, for estimating purposes, is based on a total production population of 60,000 messaging users.

It is assumed that most users have a standard Web browser and the current FAA Web servers are based on the IMAP4 or POP3 protocol. It is estimated about half of the FAA is currently using Microsoft Office 97, which includes Internet Explorer Web browser.

The NexGen project will deploy a standardized messaging server hardware and software configuration to all sites, and the appropriate number of client licenses for all features and functionality throughout the FAA. This configuration will be considered the replacement unit to be deployed at each site and will be the basis for any technical refresh. All design components will use COTS items. For costing purposes, the IA Team assumed that all server equipment required for the implementation will be new equipment.

The FAA will manage all telecommunication systems and facilities; the contractor will operate the National NexGen help desk.

4.3 Consolidation Model

The consolidation level presented in this IAR is based on an extensive study of the current capabilities, locations, support requirements, and telecommunications impact.

Preliminary analysis that led to the Initial Investment Decision (JRC-2A) was based on consolidation using functional offices, rather than geographical locations. The analysis did not include a study of the telecommunications impact and was only briefly discussed with the LOBs. The number of 268 was derived based on the estimated number of certain FAA functions at region and below. A three-tier structure was envisioned in the consolidation effort.

The JRC-2A instructed the IA Team to conduct further analysis relative to consolidating the large number of post offices down to as few as reasonable without incurring excessive cost. The result would be the FAA GFI to the prospective contractors bidding on the effort.

In November-December 2000, representatives from all the LOBs, the regional offices, and the two centers conducted an extensive analysis of the existing E-mail system and further recommended consolidation down to 123 geographic locations. Subsequent analysis indicated that further consolidation is possible.

The original concept of three tiers was replaced with two stages. Stage 1 will replace the E-mail system at the nine regional offices, FAA Headquarters, and the two centers; Stage 2 will replace the remaining E-mail systems below the regional offices.

The consolidated model assumes a significant reduction in the number of messaging post offices and servers will occur during the replacement and migration activities. Under consolidation, a large number of sites will be consolidated into regional messaging centers. The regional centers will run large message stores (Stage 1) and a limited number of mid-range servers (Stage 2) will be deployed downstream for locations that have a high concentration of local users. The goal of the consolidated model is to set a limit on the number of geographic locations at the region and below-region levels in the replacement configuration, while using the differential in money saved on hardware and software to upgrade the telecommunication required to support performance requirements. The NexGen must be equal to or better in performance than the existing cc:Mail system, and a balance will be defined between the number of locations, telecommunications upgrades required, cost, and schedule.

A consolidation of 800+ post offices to a maximum of 268 geographic locations deployed on devoted servers satisfies user requirements and can be supported by the current FAA infrastructure. Consolidations to fewer than 268 geographic locations could either inject new mail traffic onto the telecommunications network with unknown performance results or require telecommunication improvements. How telecommunications are improved could result in additional cost avoidance during future upgrades. The contractor will propose, as a part of their solution, telecommunication upgrades necessary to meet the performance requirements of the NexGen specifications document.

5.0 EVALUATION

The determination of an appropriate number of servers for consolidation was deferred until the IA Team conducted additional analyses and the impact of the number of servers on the FAA's telecommunications infrastructure. The program office conducted additional engineering analyses and a national survey of server utilization to assist in determining the appropriate level of consolidation.

The initial level of consolidation 855 down to 268 servers was based on having one server at each geographic location. Additional analysis indicated the FAA could consolidate with a horizontal approach to 123 geographic locations without requiring costly telecommunication upgrades. Further analysis indicated that through a vertical approach more consolidation could take place down to 53 geographic locations. However, the impact on performance could not be measured with this level of consolidation. Therefore, the risk associated with the FAA providing a list of locations for consolidation, and the relevant performance and telecommunications impact, became high.

In order to mitigate these risks and accommodate an acceptable implementation schedule, the decision was made to allow industry to evaluate the current infrastructure, telecommunications capability, numbers of users, and geographic locations, and recommend a solution for consolidation. In effect, this places most of the risk of performance with a given architectural design on the contractor and gives the FAA a great deal of leverage in deciding the solution that will provide the best value to the Agency.

This process was reviewed and agreed to by the technical field-experts from the regional offices and Headquarters.

6.0 TRANSITION AND IMPLEMENTATION

Moving to a replacement messaging system will require a period of coexistence, where the old cc:Mail system is operating in parallel with the new replacement messaging system. Maintaining parallel messaging systems for any extended period significantly increases costs during the period of coexistence. Users will be a member of the old E-mail or new messaging system, but never both. Otherwise, if members of a workgroup use different user IDs on different systems, they will have to enter and retrieve information redundantly to keep current. The creation of an FAA-wide directory will help mitigate most of this risk.

The schedules, risks, assumptions, resources, and cost estimates to transition and implement messaging replacement include the following:

- Complete transition from cc:Mail connectivity to NexGen. Stage 1 will take ten months from contract award to implement; Stage 2 will take nine months from the decision to exercise the Contract Line Item Number (CLIN) to implement.
- Transition to a common messaging infrastructure (i.e., TCP/IP protocols), where efficiencies can be derived, at the 800+ sites projected to receive messaging replacement.
- For remote access, there will be a significant number of modems that will maintain their current configuration, functionality, and connectivity.
- Moderate risk factor associated with modifying business processes currently in place for electronic messaging. Successful implementation of this enterprise-wide messaging system requires support from senior management and LOBs. Lack of support will have negative effects on realizing the full capability of NexGen.
- Investment in training made by each LOB to ensure the timely implementation of NexGen.
- Site preparation for implementation of Stage 2 is the responsibility of each LOB.
- Largest cost driver in initial five years of the life cycle is labor costs for system administration. Please see Attachment 4, NexGen Basis of Estimate, for a detailed explanation.

The NexGen schedule baseline shown in Table 6-1 below includes the essential acquisition and implementation events that will be monitored by the JRC.

Table 6-1. Schedule Baseline (Program Milestones)

Event	Event Completion Date	Criteria for Completion
MNS	May 2000	Signed by AIO-1
FRD	June 2000	Signed by AIO-1
APB for JRC-2a	August 2000	Briefed to the JRC and permission to proceed granted
IAR for JRC-2a	August 2000	Briefed to the JRC and permission to proceed granted
Acquisition Strategy Paper	March 2001	Signed by ARA-1
Integrated Product Plan	March 2001	Signed by ARA-1
SIR/RFP Released	March 2001	Contracting Officer release of the SIR/RFP
APB for JRC-2B	June 2001	Briefed to the JRC
IAR for JRC-2B	June 2001	Briefed to the JRC
Contract Award – Phase 1	June 2001	SSO Decision and JRC approval to proceed, Contracting Officer signature
Pilot Test	September 2001	Successful testing
Stage 1 installation begins	October 2001	Key site testing
Key Site Testing	January 2002	Site Acceptance Testing and System inter-action testing
Completion of Stage 1	April 2002	Successful Site Acceptance Tests for all locations and a successful System Acceptance Test for all Stage 1 sites
Beginning of Stage 2	April 2002 or sooner	Available funding
Completion of Stage 2 installation and migration	January 2003	All Stage 2 sites successfully pass Site Acceptance Test and a System Acceptance Test
Phase 1 System Acceptance Test	January 2003	Successful installation and migration at all sites, System Acceptance Test for all Phase 1 sites
Tech refresh every three years	FY04-05, FY07-08	Replacement of technology

Note 1: During the period of performance of the contract, in accordance with AMS, the program office will track and report Execution Level Metrics addressing each element of the program baseline as defined in this document.

7.0 ECONOMIC ANALYSIS

Since NexGen is replacing a discontinued technology service, it is not meaningful to compare the alternatives against a continuation of the baseline system. Therefore, the economic analysis done on the NexGen system is focused solely on life cycle cost. The analysis addressed three different cost options for a selected architectural design that primarily reflected variations in the amount of system administrators and timing of hardware acquisition. Please see Attachment 4, NexGen Basis of Estimate, for further detail on the development of the cost model.

7.1 Life Cycle Cost – Options One, Two and Three

The life cycle cost analysis of NexGen is based on a technical architecture design of 53 post offices at tier-1 and tier-2 sites. Given this architectural design, three options were developed that reflect variations in the number of system administrators used at the sites and the timing of hardware acquisitions. Option One is estimated using six system administrators at each tier-1 site and three system administrators at each tier-2 site. Option Two is estimated using three system administrators at each tier-1 site and two system administrators at each tier-2 site. Option Three, an extension of Option Two, is estimated with the hardware acquisition costs accelerated in FY01. The following table shows a comparison of life cycle costs, in then-year dollars, among the options:

Option One Cost Baseline (TY$M)											
53 Servers (6,3)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
Non-Recurring Total	$ 11.6	$ 13.8	$ 4.1	$ 3.2	$ 4.4	$ -	$ 3.4	$ 4.6	$ -	$ -	$ 45.1
Recurring Total	$ 10.5	$ 28.3	$ 28.9	$ 28.8	$ 29.4	$ 27.6	$ 27.8	$ 28.3	$ 29.3	$ 29.9	$ 268.6
Grand Total	$ 22.1	$ 42.0	$ 33.0	$ 32.0	$ 33.7	$ 27.6	$ 31.2	$ 32.9	$ 29.3	$ 29.9	$ 313.5
Option Two Cost Baseline (TY$M)											
53 Servers (3,2)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
Non-Recurring Total	$ 11.6	$ 13.8	$ 4.1	$ 3.2	$ 4.4	$ -	$ 3.4	$ 4.7	$ -	$ -	$ 45.3
Recurring Total	$ 8.6	$ 20.3	$ 20.8	$ 20.5	$ 20.9	$ 19.0	$ 19.0	$ 19.3	$ 20.1	$ 20.5	$ 189.0
Grand Total	$ 20.2	$ 34.1	$ 24.9	$ 23.7	$ 25.3	$ 19.0	$ 22.4	$ 24.0	$ 20.1	$ 20.5	$ 234.5
Option Three Cost Baseline (TY $M)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
53 Servers (3,2), H/W Frontloaded											
Non-Recurring Total	$ 19.6	$ 5.4	$ 4.1	$ 7.5	$ -	$ -	$ 7.9	$ -	$ -	$ -	$ 44.8
Recurring Total	$ 8.6	$ 20.7	$ 20.3	$ 20.5	$ 20.9	$ 18.9	$ 18.9	$ 19.3	$ 18.9	$ 20.5	$ 188.8
Grand Total	$ 28.2	$ 26.1	$ 24.4	$ 28.0	$ 20.9	$ 18.9	$ 26.9	$ 19.3	$ 18.9	$ 20.5	$ 233.6

Table 7-1. Life Cycle Cost Comparison of Options One, Two and Three

Furthermore, a comparative present value analysis indicates that the lowest present value alternative is Option Two ($168.5M), followed by Option Three ($169M) and Option One ($224M).

Option Two was selected as the most viable because it utilizes the most efficient number of system administrators and has the lowest present value life cycle cost. In addition, Option Two is more affordable in FY01 and FY02 than Option Three.

7.2 Life Cycle Cost – Option Two

The life cycle cost estimates for the NexGen system represent the life cycle costs in then-year (TY) dollars for the equipment acquisition, installation and migration, hardware and software

maintenance, and infrastructure improvements. The cost estimates reflected in Table 7-2 show the cost summary for non-recurring and recurring costs.

Table 7-2. Summary of NexGen Life Cycle Cost Estimates –Option Two

Option Two Cost Baseline (3.2)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
Non-Recurring Costs (TY$M)											
Prime Mission Equipment	$ 2.5	$ 3.8	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6.3
HW Tech Refresh	$ -	$ -	$ -	$ 2.7	$ 4.0	$ -	$ 2.8	$ 4.2	$ -	$ -	$ 13.7
Installation & Checkout	$ 1.3	$ 1.3	$ 2.7	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5.4
Implementation Training	$ 2.2	$ 2.3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4.6
Telecommunications Replacements & Upgrades	$ 3.6	$ 3.9	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7.4
Non-Recurring Miscellaneous	$ 1.1	$ 1.3	$ 1.0	$ 0.3	$ -	$ -	$ 0.3	$ -	$ -	$ -	$ 4.0
Recurring Costs (TY$M)											
Program Management	$ 2.8	$ 2.4	$ 1.2	$ 0.6	$ 0.6	$ 0.7	$ 0.7	$ 0.7	$ 0.7	$ 0.7	$ 11.2
Test & Evaluation	$ 0.5	$ 0.5	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 5.8
S/W Licenses	$ 0.5	$ 0.5	$ 0.5	$ 0.5	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 5.6
Hardware Maintenance	$ -	$ 0.3	$ 0.4	$ 0.3	$ 0.3	$ 0.7	$ 0.3	$ 0.4	$ 0.7	$ 0.7	$ 4.2
In-Service Training	$ -	$ -	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 2.0
System Administration & Helpdesk	$ 3.6	$ 14.0	$ 15.2	$ 15.5	$ 15.8	$ 13.7	$ 13.9	$ 14.2	$ 14.5	$ 14.8	$ 135.1
Recurring Miscellaneous	$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ 0.2	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 2.1
Combined Totals											
Non-Recurring Total	$ 11.0	$ 13.8	$ 4.1	$ 3.2	$ 4.4	$ -	$ 3.4	$ 4.7	$ -	$ -	$ 45.3
Recurring Total	$ 9.6	$ 20.3	$ 20.8	$ 20.6	$ 20.9	$ 19.0	$ 19.0	$ 19.3	$ 20.1	$ 20.6	$ 189.0
Grand Total	$ 20.7	$ 34.1	$ 24.9	$ 23.7	$ 25.3	$ 19.0	$ 22.4	$ 24.0	$ 20.1	$ 20.6	$ 234.5

- The hardware/tech refresh cost estimate (Work Breakdown Structure (WBS) #3.3.5) contains the initial cost of purchasing the NexGen hardware. Beginning in FY04, tech refresh begins on the hardware by full replacement of the servers. Based on the 'Choice of Economic Service Life (ESL) for FAA Analysis Purposes' guidance, the three-year economic service life is standard practice for computer equipment.
- The software cost estimate (WBS #3.3.5) consists of all licensing fees across the Agency. This includes the Air Traffic Controllers bringing the total seat licenses up to 60,000. Training has also been estimated for all of the 60,000 seat license holders.
- The system administration cost estimate (WBS #5.14) refers to all Government personnel responsible for maintaining the E-mail system in the field as well as at FAA Headquarters. This was estimated assuming three system administrators at each Tier-1 site and two system administrators at each Tier-2 site. In addition, there will be a centralized help desk located at FAA Headquarters to provide support for NexGen Agency-wide.
- The telecommunications upgrades cost estimate (WBS #5.11.3) consists of replacement of the dial-up telecommunication lines at various remotes locations in the regions. Additionally, this line item refers to enhancements to the telecommunication equipment to enable the NexGen functionality. Please see Attachment 6, 'Telecommunications Guidance Document for the Next Generation Messaging System'.

7.3 Assumptions, Constraints, and Methods

The cost estimates prepared for this analysis are based on the following assumptions. Please see Attachment 4, NexGen Basis of Estimate, for a detailed explanation of the cost model.

General Cost Assumptions:

- The cost estimate for NexGen is based on an industry standard ten-year life cycle, FY01-FY10.
- The inflation rate is in accordance with Office of Management and Budget (OMB) Guidelines (2.0%).
- The standard AMS WBS format was used for the cost estimate.
- The offeror will provide a solution for the consolidation of FAA post offices.
- All Agency LOBs have agreed to the proposed NexGen solution.

Non-Recurring Cost Assumptions:

- Consolidation levels were based on a minimum of 12 key sites.
- The 12 key sites consist of 9 regional offices, FAA Headquarters, Mike Monroney Aeronautical Center, and the Tech Center.
- An average of 53 sites was used for the point estimate with a minimum of 12 and a maximum of 73.
- NexGen will be implemented at the 12 sites in Phase 1, Stage 1, completed April 2002.
- Phase 1, Stages 1 and 2, installation and migration across the Agency complete January 2003.
- Tech refresh for hardware is initiated every three years, FY04 and FY07 consisting of full server replacement.
- The cost of tech refresh for software, i.e., upgrades, is included in the license fee.
- The cost of telecommunication infrastructure upgrade and replacement is based on AOP's independent assessment as described in Attachment 6, 'Telecommunications Guidance Document for the NexGen Messaging System'.

Recurring Cost Assumptions:

- The cost of software maintenance is included in the license fee.
- The centralized help desk will be located at FAA Headquarters and will be equipped with Remote Monitoring and Maintenance capabilities.
- The cost of training is based on training for 60,000 FAA users, including system administrators and end users.

7.4 Risk Adjusted Cost Estimate

The risk adjusted life cycle cost estimate (Table 7-3) is a cost baseline showing life cycle costs at the 80% confidence interval using Crystal Ball, a statistical risk analysis software package. The analysis was based on conservative point or most likely estimates provided by the IA Team. Statistical ranges were then placed around these point estimates based on expert judgment of members of the IPT. This information is then fed into Crystal Ball, which then, using Monte

Carlo simulation, calculates the 80% confidence interval on the forecasted variable, or in this case, total life cycle cost.

Table 7-3. Risk Adjusted Life Cycle Cost Estimates (TY$M)

NexGen Consolidated Model	Range (Min-Max)	High Confidence (80%)
Total Non-Recurring Cost	$33.9-$51.2	$45.3
Total Recurring Cost	$115.5-$224.5	$189.0
Total Life Cycle Cost	$149.4-$275.7	$234.5

7.5 Cost Drivers

Table 7-4 shows the cost breakout percentages for the cost drivers.

Table 7-4. Cost Drivers as Percentage of Total Cost

Option Two (3,2)		
Cost Element (TY$M)	**Total**	**% of Total**
Prime Mission Equipment	$ 6.3	3.0%
HW/SW Tech Refresh	$ 13.7	6.6%
Installation & Checkout	$ 5.4	2.6%
Telecommunications Replacements & Upgrades	$ 7.4	3.6%
Program Management	$ 11.2	5.4%
Test & Evaluation	$ 5.8	2.8%
S/W Licenses	$ 5.6	2.7%
System Administration & Helpdesk	$ 135.1	65.2%
Most Likely Total	$ 207.4	100.0%
High Confidence Total	$ 234.5	

8.0 AFFORDABILITY ASSESSMENT

The total acquisition cost for conducting NexGen messaging over the ten-year life cycle is estimated in then-year dollars at $45.3M. Most of the expenditures for acquisition will take place across FY01 and FY02. As shown in Table 8-1 there is a $1.9M shortfall with the current FY01 funding allocation. At the eve of the JRC, ABA/ABU has committed to covering the FY01 shortfall for the recommended option.

Table 8-1. Budget Impact Versus Acquisition Costs

Option Two (TY$M)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
53 Servers (3,2)											
Non-Recurring Acquisition Costs	$ 11.6	$ 13.0	$ 4.1	$ 3.2	$ 4.4	$ -	$ 3.4	$ 4.7	$ -	$ -	$ 45.3
Current Budget Obligation	$ 9.7	$ 10.0									
Budget Shortall/Surplus	$ (1.9)	$ (3.0)									

9.0 RECOMMENDATION

The Investment Analysis Team recommends the JRC approve the following:

- The replacement of the current e-mail system with the Next Generation Messaging System by ASU-500.
- The APB funding profile of $234.5M over a 10-year life cycle in Operations and Maintenance funds.